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quite normal. As concerns the brain, Broca has remarked that the asymmetry of the convolutions is the special advantage of man and the more highly developed animals, while the convolutions in the primates, negro, and idiots, tend to become more and more symmetrical. Such ideas as these are of course quite out of harmony with those of the Italian school. For the purpose of seeing whether the skulls of the lower animals corresponded with their more symmetrical brain development, the author studied the relations of the frontal suture on many existing and some extinct species, and found all plainly asymmetrical, and some so to a very considerable degree. It appears from this study that brain and skull are not so interdependent, and further, that there may be some reason for considering asymmetry as the rule in the development of animal structures, and that when the Italian school point to the asymmetry of the skull as a characteristic of the criminal class, the abnormality really lies in the excessive development of the difference between the two sides rather than in a departure from perfectly symmetrical growth.

Kraniometrie und Kephalometrie. Vorlesungen gehalten an der Wiener Allgemeinen Poliklinik von M. BENEDIKT. Mit 36 Holzschnitten, viii und 172 S. Wien und Leipzig, Urban und Schwarzenberg, 1888. Reviewed in *Neurolog. Centralblatt*, No. 10, 1888, by Sommer.

The author has first to call attention to the relations between the atypical development of the skull and abnormal brain functioning, while the final goal of craniology is from the study of the form of the skull to infer all the laws of its growth. In his own studies he has used an elaborate instrument called an optical kathetometer. From his investigations, he is led to the view that the exterior of all skulls presents a definite number of spherical surfaces, often with very various radii; that these stand in relation to definite portions of the brain, and that between these two there is a fixed relation of growth. To determine the centres for the spheres which these surfaces represent, and to compare the changes that these centres experience with the growth of the individual, etc., are, according to Benedikt, lines of research which would be very profitable, but which he has not followed. Among the special points which he has made out are that in cases of congenital (or early acquired) blindness, there is a noticeable shortening of the interparietal arch; in congenital aphasia, stenokratophy, in deafness, a shortening of the temporal arch; in epilepsy, a deformation of the parietal bones, and in criminal and psychopathic individuals a flattening of the frontal bone. Finally, he discusses the methods for determining the capacity of macerated skulls, and finds no method which is thoroughly satisfactory.

Ueber die Erregbarkeit einzelner Faserbündel im Rückenmark neugeborener Thiere. W. BECHTEREW, in Kasan. *Neurolog. Centralbl.* No. 6, 1888.

In attempting to test the function of different bundles of fibres in the spinal cord, the author has hit on the happy idea of using newborn animals. As is well known, only a portion of the bundles of fibres in the cord are medullated at birth. Bechterew assures him-

self that those which are non-medullated are neither irritable nor conductive, and, further, that by using weak electrical stimuli, the escape of the current, so much talked of, in such observations, is to be little feared. These facts being accepted, the results have much value.

He experimented on puppies without any anaesthetic. In new-born puppies, the lateral and anterior portion of the posterior columns, the so-called root portion of the columnae cuneatae, the fundamental tracts in the anterior and lateral columns, and the direct cerebellar tract, are alone medullated. About five days after birth, the columns of Goll become medullated, and eleven to thirteen days after birth the pyramidal tracts acquire their sheaths.

Stimulating the cut section of the cord in new-born puppies, in the region of the root fibres of the cuneate columns, produces a contraction of the muscles which are innervated by motor nerves arising at that level, much the result one would get from stimulating the posterior nerve roots of the region.

Stimulation of the columns of Goll, five days, later produces reflex contractions of the head, trunk and limbs, as in the adult, but without any indications of pain. It will be seen that the reaction is more diffused in this second case. The stimulation of the antero-lateral fundamental tract in the caudal portion of the cord, the section having been made in the cervical region, produced contractions in the fore and hind limb of the same side, and in the tail, thus indicating the connections of these fibres.

Stimulation of the central end of the cord in the anterior part of the lateral region gave indications of centripetal fibres in this region, probably the tract described by Bechterew and Gowers, while the stimulation of the direct cerebellar tract gave characteristic movements of the head and trunk.

Not only, therefore, are these separate bundles in the cord each excitable, but each has a more or less distinct reaction.

Ueber die centralen Endigungen des N. vagus und über die Zusammensetzung des sogenannten solitären Bündels des verlängerten Marks.

W. BECHTEREW. Wjestnik psychiatrii i nevropatologii, 1888, V. 2, Russisch. Reviewed in Neurolog. Centralbl. 1888, No. 10, by P. Rosenbach.

For the study of the terminations of the vagus fibres in the medulla, Bechterew found foetuses about 28 cm. in length best suited, because at that stage of development it is mainly the nerve roots that are medullated, and these can then be easily followed by Weigert's method. The vagus fibres take several courses within the medulla. A considerable portion goes direct to the vagus nucleus. Another portion crosses the middle line to the N. ambiguus of the other side, while some fibres end in the N. ambiguus of the same side. Finally a portion goes to the Funiculus solitarius of the same side. The fibres entering the funiculus after a time emerge from it, and crossing the middle line, appear to end in a group of cells which lies mesial of the hypoglossus roots, dorsad of the inferior olive, and is longitudinally co-extensive with the hypoglossus nucleus. (This nucleus was described by Misslawski, see Neurolog. Centralbl. 1886, p. 560, and was stated by him to be the most important reflex centre for respiration.) The only other fibres which enter into the F. solita-